



In re Application of:

Chung et al.

Patent No.: 6,936,906

Issued:

August 30, 2005

Serial No.: 09/965,373

Filed:

September 26, 2001

For:

INTEGRATION OF BARRIER

LAYER AND SEED LAYER

Certificate of Correction Branch Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

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Group Art Unit: 2814

Examiner:

Wai-Sing Louie

Certificate

AUG 3:1 2006

of Correction

CERTIFICATE OF MAILING

37 CFR 1.8

I hereby certify that this correspondence is being deposited on 4/VY _, 2006 with the United States Postal Service as First Class Mail in an envelope addressed to: Certificate of Correction Branch, Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

8/24/06

Signature

Dear Sir:

REQUEST FOR CERTIFICATE OF CORRECTION

Attached is a Certificate of Correction for correcting several errors throughout the printed patent.

The missing references were cited by the Applicant in an Information Disclosure Statement filed on August 31, 2004. It appears that these references were lost, and thus they do not appear on the printed patent. Attached is a copy of the PTO/SB/08a as originally submitted on August 31, 2004, as well as a copy of the stamped return receipt postcard showing evidence that the Patent Office acknowledged receipt of this Information Disclosure Statement with (206) references.

Applicants submit that the errors in the dependency of claims 14 and 15 were not made by the applicants, but were made during the printing of the patent.

08/30/2006 SFELEKE2 00000022 200782 6936906

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Applicants submit that at least one of the other errors mentioned above was made by the applicants. Therefore, please charge the fee of \$100.00 to deposit account no. 20-0782/APPM/6303.02 (KMT).

Respectfully submitted,

Keith M. Tackett

Registration No. 32,008

PATTERSON & SHERIDAN, L.L.P.

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Houston, TX 77056

Telephone: (713) 623-4844 Facsimile: (713) 623-4846

Agent for Applicant(s)

PATENT NO.: 6,936,906

Page 1 of 8

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the Cover of the Patent

Item [56], References Cited, U.S. PATENT DOCUMENTS: Please include the following references:

6,686,271	2/2004	Raaijmakers et al.
6,660,660	12/2003	Haukka et al.
6,632,279	10/2003	Ritala et al.
6,630,201	10/2003	Chiang et al.
6,620,956	9/2003	Chen et al.
6,620,723	9/2003	Byun et al.
6,620,670	9/2003	Song et al.
6,607,976	8/2003	Chen et al.
6,599,572	7/2003	Saanila et al.
6,585,823	7/2003	Van Wijck
6,569,501	5/2003	Chiang et al.
6,551,929	4/2003	Kori et al.
6,548,424	4/2003	Putkonen
6,534,395	5/2003	Werkhoven et al.
6,511,539	1/2003	Raaijmakers
6,489,214	12/2002	Kim et al.
6,482,740	11/2002	Soininen et al.
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6,482,262	11/2002	Elers et al.
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6,399,491	6/2002	Jeon et al.
6,391,785	5/2002	Satta et al.
6,379,748	4/2002	Bahndari et al.
6,372,598	4/2002	Kang et al.
6,358,829	3/2002	Yoon et al.
6,348,376	2/2002	Lim et al.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Keith M. Tackett PATTERSON & SHERIDAN, L.L.P. 3040 Post Oak Blvd., Suite 1500 Houston, TX 77056-6582

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PATENT NO.: 6,936,906 Page 2 of 8

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

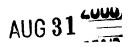
It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

6,342,277	1/2002	Sherman et al.
6,335,240	1/2002	Kim et al.
6,284,646	9/2001	Leem
6,207,487	3/2001	Kim et al.
6,197,683	3/2001	Kang et al.
5,526,244	6/1996	Bishop
5,464,666	11/1995	Fine et al.
5,306,666	4/1994	Izum i
3,594,216	7/1974	Charles et al.
20040053484	3/2004	Kumar et al.
20040051152	3/2004	Nakajima
20040048491	3/2004	Jung et al.
20040046197	3/2004	Basceri et al.
20040043630	3/2004	Vaartstra et al.
20040033698	2/2004	Lee et al.
20040028952	2/2004	Cartier et al.
20040018747	1/2004	Lee et al.
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20040018304	1/2004	Chung et al.
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20040015300	1/2004	Ganguli et al.
20040014320	1/2004	Chen et al.
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20030198754	10/2003	Xi et al.
20030190804	10/2003	Glenn et al.
20030190497	10/2003	Yang et al.
20030190423	10/2003	Yang et al.
20030186495	10/2003	Saanila et al.
20030185980	10/2003	Endo

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PATENT NO.: 6,936,906 Page <u>3</u> of <u>8</u>

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

20030173586 20030172872	9/2003 9/2003	Moriwaki et al. Thakur et al.
20030172672	9/2003	Basceri et al.
20030165615	9/2003	Aaltonen et al.
20030160277	9/2003 8/2003	Bhattacharyya
	7/2003	,,
20030143841	7/2003	Yang et al.
20030143839		Raaijmakers et al.
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20030134508	7/2003	Raaijmakers et al.
20030129826	7/2003	Werkhoven et al. Chen et al.
20030129308	7/2003	***************************************
20030124262	7/2003	Chen et al.
20030121608	7/2003	Chen et al.
20030116804	6/2003	Visokay et al.
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20030097013	5/2003	Chen et al.
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20030059538	3/2003	Chung et al.
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20030053799	3/2003	Lei
20030049942	3/2003	Haukka et al.
20030049931	3/2003	Byun et al.
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20030032281	2/2003	Werkhoven et al.
20030031807	2/2003	Elers et al.
20030015764	1/2003	Raaijmakers et al.

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AUG 3

PATENT NO.: 6,936,906

Page 4 of 8

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

20030013320 20030013300 20020197881	1/2003 1/2003 12/2002	Kim et al. Byun Ramdani et al.
20020197863	12/2002	Mak et al.
20020197402	12/2002	Chiang et al.
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20020076508	6/2002	Chiang et al.
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20020076481	6/2002	Chiang et al.
20020074588	6/2002	Lee
20020073924	6/2002	Chiang et al.

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PATENT NO.: 6,936,906

Page <u>5</u> of <u>8</u>

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

20020068458	6/2002	Chiang et al.
20020052097	5/2002	Park
20020048635	4/2002	Kim et al.
20020041931	4/2002	Suntola et al.
20020031618	3/2002	Cho et al.
20020021544	2/2002	Park et al.
20020020869	2/2002	Park
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20010050039	12/2001	Park
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20010024387	9/2001	Raaijmakers et al.
20010009695	7/2001	Saanila et al.
20010009140	7/2001	Bondestam et al.
20010002280	5/2001	Sneh
20010000866	5/2001	Sneh et al.

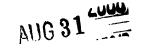
Item [56], References Cited, FOREIGN PATENT DOCUMENTS: Please include the following references:

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EP 1,142,894 A2
                 10/2001 Morman et al.
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                 1/2002
                          Park
JP 07-300649 A
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WO 02/065525 A1 8/2002
                          Pomarede et al.
WO 02/067319 A2 8/2002
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                 6/2002
                          Chiang et al.
WO 03/044242 A2 5/2003
                          Chen et al.
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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.: 6,936,906

Page <u>6</u> of <u>8</u>

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Item [56], References Cited, OTHER PUBLICATIONS: Please include the following references:

Applied Phys. Lett. 71 (25), December 22, 1997 (3604-06)

Chang-Wook et al. "Growth and Characterization of Aluminum Oxide (Al₂O₃) Thin Films by Plasma-Assisted Atomic Layer Controlled Deposition," J. Korean Inst. Met. Mater., Vol. 38, No. 10, Oct. 2000 pp. 1395-1399.

Chang-Wook et al. "Plasma-assisted Atomic Layer Growth of High-Quality Aluminum Oxide Thin Films," Jpn. J. Appl. Phys. 1, Vol. 40, No. 1, Jan. 2001 pp. 285-289.

Clark-Phelps et al. "Engineered Tantalum Aluminate and Hafnium Aluminate ALD Films for Ultrathin Dielectric Films with Improved Electrical and Thermal Properties," Mat. Res. Soc. Symp. Proc. Vol. 670 (2001).

Eisenbraum et al. "Atomic Layer Deposition (ALD) of Tantalum-based materials for zero thickness copper barrier applications," Proceedings of the IEEE 2001 International Interconnect Technology Conference (Cat. No. 01EX461) 2001.

Hwang et al. "Nanometer-Size α-PbO₂-type TiO₂ in Garnet: A Thermobarometer for Ultrahigh-Pressure Metamorphism," Science Vol. 288 (14 Apr 2000).

International Search Report for PCT/US02/28715 dated May 30, 2003 (AMAT/6303-PCT).

Juppo et al. "Deposition of Copper Films by an Alternate Supply of CuCl and Zn," Journal of Vacuum Science & Technology, Vol. 15, No. 4 (July 1997), pp. 2330-3.

Kukli et al. "Atomic Layer Epitaxy Growth of Tantalum Oxide Thin Films from $Ta(OC_2H_5)_5$ and H_2O_1 " Journal of the Electrochemical Society, Vol. 142, No. 5, May 1995, p. 1670-5.

Kukli et al. "In situ Study of Atomic Layer Epitaxy Growth of Tantalum Oxide Thin Films From Ta(OC₂H₅)₅ and H₂O," Applied Surface Science, Vol. 112, March 1997, p. 236-42.

Kukli et al. "Properties of $\{Nb_{1-x}Ta_x\}_2O_5$ Solid Solutions and $\{Nb_{1-x}Ta_x\}_2O_5$ -ZrO₂ Nanolaminates Grown by Atomic Layer Epitaxy," 1997, p. 785-93.

Kukli et al. "Tailoring the Dielectric Properties of HfO₂-Ta₂-O₅ Nanolaminates," Applied Physics Letters, Vol. 68, No. 26, June 24, 1996, p. 3737-9.

Martensson et al. "Cu₂ as Copper Source in Atomic Layer Epitaxy," Chamical Vapor Deposition, Proceedings of the Fourteenth International Conference and EUROCVD-11 (1997), pp. 1529-36.

Martensson et al. "Use of Atomic Layer Epitaxy for Fabrication of Si/TiN/Cu Structures," Journal of Vacuum Science & Technology, Vol. 17, No. 5 (Sept 1999), pp. 2122-8.

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PATENT NO.: 6,936,906 Page <u>7</u> of <u>8</u>

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Paranjpe et al. "Atomic Layer Deposition of AlO₃ for Thin Film Head Gap Applications," J. Elec. Soc., Vol. 148, No. 9, Sept., 2001 pp. G465-471.

PCT Written Opinion for PCT/US02/28715 DATED July 28, 2004 (AMAT/6303-PCT).

Proceedings of the IEEE 1998 International Interconnect Technology Conference - San Francisco, California, June 1-3, 1998.

Ritala et al. "Atomic Force Microscopy Study of Titanium Dioxide Thin Films Grown by Atomic Layer Epitaxy," Thin Solid Films, Vol. 228, No. 1-2 (15 May 1993), pp. 32-35.

Ritala et al. "Atomic Layer Deposition of Oxide Thin Films with Metal Alkoxides as Oxygen Sources," Science Vol. 288 14 Apr. 2000.

Ritala et al. "Atomic Layer Epitaxy Growth of TiN Thin Films From Til₄ and NH₃," J. Electrochem. Soc., Vol. 145, No. 8 (Aug., 1998) pp. 288-95.

Ritala et al. "Effects of Intermediate Zinc Pulses on Properties of TiN and NbN Films by Atomic Layer Epitaxy," Applied Surface Science, Vol. 120, No. 3-4 (Dec. 1997), pp. 199-212.

Ritala et al. "Growth of Titanium Dioxide Thin Films by Atomic Layer Epitaxy," Thin Solid Films, Vol. 225, No. 1-2 (25 March 1993) pp. 288-95.

Ritala et al. "Surface Roughness Reduction in Atomic Layer Epitaxy Growth of Titanium Dioxide Thin Films," Thin Solid-Films, Vol. 249, No. 2 (15 Sept. 1994), pp. 155-62.

Rossnagel et al. "Plasma-enhanced Atomic Layer Deposition of Ta and Ti for Interconnect Diffusion Barriers," J. Vac. Sci. Technol. B., Vol. 18, No. 4 (July 2000), p. 2016-20.

Utriainen et al. "Studies of Metallic Thin Film Growth in an Atomic Layer Epitaxy Reactor Using M(acac)₂(M=Ni,Cu,Pt) Precursors," Applied Surface Science, Vol. 157, No. 3 (2000), pp. 151-158.

In the Specification

Column 2, Line 30: Change "allloy" to --alloy--

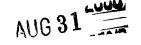
Column 2, Line 34: Delete "of"

Column 3, Line 10: Change "embodiment" to --embodiments--

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO.: 6,936,906

Page 8 of 8

APPLICATION NO.: 09/965,373

DATED: Aug. 30, 2005

INVENTOR(S): Hua CHUNG, Ling CHEN, Jick YU, Mei CHANG

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, Line 56: After "Ta(N(Et)Me) 5", insert --),--

Column 6, Line 18: Insert a comma after "(C₄H₉N₂H₃)"

Column 8, Line 36: Change "include" to --includes--

In the Claims

Column 16, Claim 7, Line 17: Change the colon to a semicolon

Column 16, Claim 14, Line 50: Change "7" to --1--

Column 16, Claim 15, Line 54: Change "7" to --1--

Column 16, Claim 18, Line 63: Change "n" to --in--

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

re Application of:

Chung, et al.

Serial No.: 09/963,373

Confirmation No.: 6509

Filed:

September 26, 2001

For:

INTEGRATION OF

BARRIER LAYER AND

SEED LAYER

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Group Art Unit: 2814

Examiner:

Wai Sing Louie

MAIL STOP AMENDMENT Commissioner for Patents P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

CERTIFICATE OF MAILING

37 CFR 1.8

I hereby certify that this correspondence is being deposited on August 31, 2004 with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

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The Applicants, and the Attorney who signs below on the basis of the information supplied by the inventor and the information in his file, submit herewith patents, publications, or other information of which they are aware, which may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

While the information submitted in this Supplemental Information Disclosure Statement may be material pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication, or other information referred to therein is prior art for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97, this Supplemental Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other possibly material information as defined under 37 CFR § 1.56(a) exists.

The patents and/or publications submitted herewith are set forth on the attached Form PTO-1449.

If the sum of \$180.00 is due under 37 CFR § 1.17(p) pursuant to § 1.97, the Commissioner is hereby authorized to charge this fee, and any other fee necessary to make this submission timely, to the Deposit Account No. 20-0782/AMAT/6303.02/KMT.

Respectfully submitted,

Keith M. Tackett

Registration No. 32,008

MOSER, PATTERSON & SHERIDAN, L.L.P.

3040 Post Oak Blvd. Suite 1500

Houston, TX 77056

Telephone: (713) 623-4844 Facsimile: (713) 623-4846 Attorney for Applicant(s)

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(Use as many sheets as necessary)

Sheet 1 of

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Application Number	09/963,373
Filing Date	September 26, 2001
First Named Inventor	Chung, et al.
Group Art Unit	2814
Examiner Name	Wai Sing Louie
Attorney Docket Number	AMAT/6303.02/CPICOPPER/PJS
Submission Date	August 31, 2004

Examiner	Cite	Document Number	D. Minetine C.	Pages, Columns, Lines,		
Initials* No.1 Number-Kind Code ^{2 (# known)}	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Relevant Passages or Relevant Figures Appear			
	A1	US-6686271 B2	02/03/2004	Raaijmakers, et al.		
	A2	US-6660660 B2	12/09/2003	Haukka, et al.		
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	A28	US-6428859 B1	08/06/2002	Chiang, et al.		

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE offection of information unless it displays a valid OMB control number. 09/963,373 Substitute for form 1449A/PTC Application Number September 26, 2001 Filing Date SUPPLEMENTAL IN 的 First Named Inventor Chung, et al. DISCLOSURE STATEME **Group Art Unit** 2814 **APPLICANT Examiner Name** Wai Sing Louie Attorney Docket Number AMAT/6303.02/CPICOPPER/PJS (Use as many sheets as necessary) Sheet 9 Submission Date August 31, 2004

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.1	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant
		Number-Kind Code ^{2 (# known)}	WIW-DB-1111	Applicant of Office Document	Figures Appear
	A29	US-6416822 B1	07/09/2002	Chiang, et al.	
	A30	US-6416577 B1	07/09/2002	Suntoloa, et al.	
	A31	US-6399491 B2	06/04/2002	Jeon, et al.	
	A32	US-6391785 B1	05/21/2002	Satta, et al.	
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Sheet 3 of

4	ASSESSMENT TEMPORES OF TEMPORAL TO A COMPLETION	TO SHORT SHORT THE SET OF DESCRIPTS A VARIO COME CONTROL HOUSE		
	Application Number	09/963,373		
	Filing Date	September 26, 2001		
	First Named Inventor	Chung, et al.		
Group Art Unit		2814		
	Examiner Name	Wai Sing Louie		
İ	Attorney Docket Number	AMAT/6303.02/CPICOPPER/PJS		
	Submission Date	August 31, 2004		

Examiner Initials*	Cite No.1	No.1	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant
		Number-Kind Code ^{2 (f known)}		Applicant of Cited Document	Figures Appear
	A55	US-20040018304 A1	01/29/2004	Chung, et al.	
	A56	US-20040016866 A1	01/29/2004	Huang, et al.	
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09/963,373 Substitute for form 1449A/PTO Application Number Filing Date September 26, 2001 SUPPLEMENTAL INF First Named Inventor Chung, et al. DISCLOSURE STATEM Group Art Unit 2814 **APPLICANT** Wai Sing Louie **Examiner Name** (Use as many sheets as necessary) Attorney Docket Number AMAT/6303.02/CPICOPPER/PJS

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		Number-Kind Code ^{2 (f krown)}	MIM-DD-1111	Applicant of Cited Document	Figures Appear
	A83	US-20030134508 A1	07/17/2003	Raaijmakers, et al.	
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	A108	US-20030054631 A1	03/20/2003	Raaijmakers, et al.	
	A109	US-20030053799 A1	03/20/2003	Lei	
	A110	US-20030049942 A1	03/13/2003	Haukka, et al.	

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APPLICANT

Sheet

Application Number	09/963,373
Filing Date	September 26, 2001
First Named Inventor	Chung, et al.
Group Art Unit	2814
Examiner Name	Wai Sing Louie
Attorney Docket Number	AMAT/6303.02/CPICOPPER/PJS
Submission Date	August 31, 2004

U.S. PATENT DOCUMENTS					
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	_	Number-Kind Code ^{2 (# krown)}	WINI-DD-1111	Applicant of Oned Document	Figures Appear
	A111	US-20030049931 A1	03/13/2003	Byun, et al.	
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	A113	US-20030032281 A1	02/13/2003	Werkhoven, et al.	
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···	A132	US-20020144657 A1	10/10/2002	Chiang, et al.	
	A133	US-20020144655 A1	10/10/2002	Chiang, et al.	
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	A135	US-20020127336 A1	09/12/2002	Chen, et al.	, , , , , , , , , , , , , , , , , , , ,
	A136	US-20020122884 A1	09/05/2002	Chen, et al.	-
	A137	US-20020117399 A1	08/29/2002	Chen, et al.	
	A138	US-20020115252 A1	08/22/2002`	Haukka, et al.	

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SUPPLEMENTAL INFORMATION
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APPLICANT

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Sheet 6 of 9

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Application Number	09/963,373
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Initials*	No.¹	Number-Kind Code ^{2 (il known)}		Applicant of Cited Document	Relevant Passages or Relevant Figures Appear
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SUPPLEMENTAL INFORMATION

DISCLOSURE STATEMENTAL Group Art Uni

Application Number 09/963,373

Filing Date September 26, 2001

First Named Inventor Chung, et al.

Group Art Unit 2814

Examiner Name Wai Sing Louie

Attorney Docket Number AMAT/6303.02/CPICOPPER/PJS

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APPLICANT

Sheet 7 of 9 Submission Date August 31, 2004

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE no persons are required to respond to collection of information unless it displays a valid OMB control number. 09/963,373 Substitute for form 1449A/PTQ **Application Number** AUG 2 9 2006 Filing Date September 26, 2001 SUPPLEMENTAL INKORMAT First Named Inventor Chung, et al. DISCLOSURE STATE Group Art Unit 2814 **APPLICANT Examiner Name** Wai Sing Louie AMAT/6303.02/CPICOPPER/PJS Attorney Docket Number (Use as many sheets as necessary)

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	(A) 100 8	Filing Date	September 26, 2001	
SUPPLEMENTAL I	NFORMATION	First Named Inventor	Chung, et al.	
	— —	Group Art Unit	2814	
APPLICA	ANT	Examiner Name	Wai Sing Louie	

Attorney Docket Number

Submission Date

AMAT/6303.02/CPICOPPER/PJS

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APPLICANT: Applied Naterials, Inc.
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